Experimental pragmatics and causal meaning: The case of Modern Greek markers *γiati* and *epiδi*[1]

Valandis Bardzokas
Aristotle University of Thessaloniki
valandis.bardzokas@gmail.com

Abstract
This paper attempts to corroborate the claim made recently for a differentiating treatment of the two prototypical, monolexemic causal connectives in Modern Greek, i.e. *γiati* and *epiδi*, this time from an experimental pragmatic point of view. To achieve this aim, our experiment involves observing native speakers of Modern Greek of two age groups, that is, children and adults. At the same time, taking up this issue necessarily involves challenging the traditional justification of experimental pragmatics by recourse to the research on scalar implicatures. Hence, we aim to broaden the experimental pragmatic view, so that its scope includes causal subordinators, rather than just coordinating markers.

Keywords: experimental pragmatics, relevance-theory, conceptual/procedural meaning, causal connectives

1. Introduction

The aim of this paper is to substantiate the claim made recently in the semantic/pragmatic literature on Modern Greek causality, namely that the two prototypical exponents of causal subordination, i.e. *γiati* and *epiδi*, are not synonymous, to the extent that they are not interchangeable across contexts (Kitis 2006). In order to substantiate this claim, we will draw on experimental facts pertaining to the use of these two markers.

Experimental observations of pragmatic meaning have typically been guided by a constant concern with scalar terms of quantity and the role they assume in separating semantic from pragmatic aspects of meaning (Carston 2002; Katsos 2008; Levinson 2000; Papafragou 2002; Sperber & Wilson 1995). While the results of scalar experiments have so far offered substantial feedback to this end, a strict definition of the aims of experimental pragmatics in purely scalar terms may severely constrain the scope and methods of experimental research and, specifically, the type of results that it contributes to the determination of the distinction between semantic and pragmatic

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interpretation.

In light of the requirement to widen the scope of experimental pragmatics, the present work brings into play discourse markers, other than scalar coordinators typically examined from the traditional experimental approach, e.g. *and*. Interestingly a variety of discourse markers, typically characterised as instances of conventional implicature, e.g. *therefore, but, nevertheless*, have inspired intensive research on the defining properties of propositional meaning, or what is said vs. what is implicated, since the origin of pragmatic investigation (Grice 1989). However, the results of this research have rarely received serious experimental consideration, if they received any at all.

If the distinction between what is said and what is implicated in sentences containing such markers as determined or affected by their function has been notoriously hard to pin down, the challenge increases considerably in the case of near-synonymous connectives. Causal subordination, for example, may afford more than one prototypical marker, as in the case of Modern Greek *γiati* and *epiδi*, both markers being invariably glossed as *because* in English translations.

The current enterprise follows up on the controversial claim that these two Modern Greek causal connectives merit a differentiating treatment considering their distinct distributional proclivities (Kitis 2006). In fact, a closer investigation of the finely grained distinctions in causal meaning revealed the requirement for a more versatile cognitive-pragmatic model, that of relevance theory (Sperber & Wilson 1995). In this framework there has been ample evidence (Bardzokas 2012, 2013, 2014) in favour of a differentiating treatment between *epiδi* and *γiati*, the former receiving an exclusively propositional/conceptual reading, in contrast to the polyfunctional *γiati*, the meaning description of which in either propositional/conceptual or non-propositional/ procedural terms seems contingent on its contextual application.

To substantiate the claim that the two markers, *epiδi* and *γiati*, are not synonymous, we will now adopt the experimental view of discourse connectives, particularly causal connectives. More specifically, we will attempt to procure experimental evidence in favour of the foregoing generalisation concerning the meaning of the two causal markers at hand, taking interest in the behaviour that native speakers of Greek demonstrate in using the markers. In particular, we will demonstrate that both children

and adults prefer the use of *γiati* to mark non-propositional linkage, rather than *epidi*, which is mainly used to mark propositional connections, as is explained in section 2[2].

On a more Sweetserean analysis of causal meaning, we intend to single out the type of non-propositional conjunction that receives an epistemic reading (Sweetser 1990). The rationale for narrowing down the range of non-propositional causal uses, including speech act (Sweetser 1990) and metacommunicative ones (Kalokerinos 2004), to epistemic uses is to ensure an economical experimental process that test-subjects would find manageable. In this light, the aim of the experiment is to provide evidence of the preference for using *γiati*, rather than *epiδi*, to mark epistemic causal connections.

To the extent, however, that the two Modern Greek exponents of causal subordination serve as vehicles of propositional vs. non-propositional conjunctive meaning, our survey has two aims: (i) to measure the speakers' potential inclination in using *γiati* and find out the subjects' preferred choice of connective in epistemic-reading conjunctions, as well as (ii) offer finer results, within each one of the age groups that the body of subjects has been divided into. This type of compartmentalised observation is of particular relevance in the experiment that involves children. In particular, to the extent that each age group represents a different level of study - staring from the age of 5 all the way towards the last class of 12 year-old 6th graders - these findings are meant to elucidate not only prospective differentiations in the use of causal connectives among the set of age groups observed, but also the degree to which the subjects' attitude to epistemic marking develops with age. In fact, since the participants are in the process of acquiring their mother tongue, an interesting question to address pertains to the effect that grammar instruction has on the students' word choice, or choice of connectives, for that matter. Lastly, the results of the experiment are expected to corroborate the view that disparate underlying contexts disallow intersubstitutability (Kalokerinos 2004; Kitis 2006; Μπακάκου-Ορφανού 2007).

In what follows, in section 2 we present the pragmatic claims that have been postulated in respect of the distinct applications of *γiati* and *epiδi*. Section 3 presents the two experiments conducted, namely the aims of the experiments, the profile of the

[2] The distinction between propositional and non-propositional causal linkage is illustrated in section 2.

subjects implicated, the materials made use of and, finally, the results that we obtained. Lastly, in section 4, we interpret our findings in relation to the aims of the experiments.

2. The case of *γiati* and *epiδi* from the relevance-theoretic viewpoint

We have argued (Bardzokas 2012; Kitis 2006) that the following Sweetserian cases of causal context are not treatable on a par:

(1) John came back because he loved her.
(2) John loved her because he came back.
(3) What are you doing tonight because there's a good movie on.

(Sweetser 1990: 74)

That is, there is a transparent contrast in causal expression and the underpinning contextual circumstances between the utterance in (1) and these in (2)-(3). Specifically, even though the former case instantiates 'real world' cause (Sweetser 1990), thus, expressing a fully encoded propositional link between a cause and an effect state of affairs (*p* and *q*), the latter two cases typify loosely expressed conjunctions. In this sense, the connection in (1) is readily paraphrasable in the terms of *the reason why* q *is* p, i.e. *the reason why John came back is that he loved her*, as the linguistic (conjunctive) material contained in the original utterance suffices for the rewording in the paraphrased version. On the other hand, the propositional explicitness test seems to filter out the latter utterances on the grounds of linguistic underdeterminacy: **The reason why John loved her is that he came back*, **The reason why what are you doing tonight is that there is a good movie on*. In fact, the way to reverse this test result is to restore propositionality in the corresponding causal conjunctions: *The reason why* the speaker concludes that *John loved her is that he came back, The reason why I'm inviting you out is that there's a good movie on*.

As has been pointed out (Kitis 2006), the two Modern Greek causal markers that prototypically translate the invariably applied *because* in the utterances above, i.e. *epiδi* and *γiati*, are not interchangeable, upon closer inspection[3]. Namely, while the

[3] Pre-posed cases of adverbial clauses, i.e. *because q, p*, are left out of the scope of our discussion here. This choice was made in view of the syntactic constraint that Modern Greek imposes on this configuration licensing exclusively the use of *epiδi*. In this respect, the purpose of the present contrastive meaning investigation is optimally served in the context of, i.e. *q because p*, that secures equal, as it were, terms of marker distribution.

use of *epiδi* is manly reserved for explicitly encoded cause-and-effect relations, as in (1), *γiati* is under so such distributional constraint. Therefore, the utterances in (2)-(3) tend to preclude the access of *epiδi*, which has, in this respect, been deemed the marker of 'direct cause' or causal marker *par excellence* (Kitis 2006). Observe the distributional proclivities of the two connectives in the following translation renderings of our examples:

(4) Ο Γιάννης επέστρεψε επειδή/γιατί την αγαπούσε.
John came back epiδi/γiati την αγαπούσε.

(5) Ο Γιάννης την αγαπούσε γιατί/*επειδή επέστρεψε.
John loved her γiati/*epiδi he came back.

(6) Τι κάνεις απόψε γιατί/*επειδή έχει μια καλή ταινία.
What are you doing tonight γiati/*epiδi there's a good movie on.

On account of their distinct realisation proclivities, the view that has recently been postulated (Bardzokas 2012, 2013) is that the connectives under scrutiny can be accounted for rigorously and economically in terms of the distinction that has been designed in the relevance theoretic, viz. the distinction between conceptual and procedural meaning.

Roughly speaking, conceptual meaning is typically taken to be encoded in content words, such as nouns or verbs, whereas procedural meaning is regarded as encoded in discourse markers, especially of the sort that impose a linguistic constraint on the hearer's inferential activity in the course of the comprehension process. While conceptual content maps directly onto the ultimate interpretation of an utterance, as this is intended by a speaker, procedural constraints serve the rather different purpose of accelerating the hearer's utterance interpretation[4].

On the particular account, the connection in (4) has been illustrated to enter the types of logical relation that lexical items earmarked as concepts do, in Wilson and Sperber's (1993) terms, while the cases in (5)-(6) are uniformly accommodated along procedural lines of interpretation.

In particular, the relevance-theoretic principle is taken to condition the

[4] Admittedly, the distinction between conceptual and procedural meaning allows for a number of exceptions, discussed in detail by Wilson and Sperber (1993). However, this brief account of it suffices for the purpose of the current research.

coordination between the speaker and the hearer, so that the speaker provides the *γiati*-introduced clause (in the underspecified link) as linguistic evidence of his intention to communicate a cause-and-effect relation. On this stipulation, the hearer presumes the relevance of the utterance at issue in selecting the most accessible context, which is expected to yield the cognitive effects that ultimately restore the representational content of the intended cause-and-effect relation: concluding in (5) and inviting in (6). Granted the pragmatic contribution to the derivation of the full-fledged causal assumption, the speaker's intended interpretation of the *γiati*-introduced clause is conceived of as treatable in procedural terms, in alignment with the discourse particle *huh*, the appearance of which can make a procedural contribution to the recovery of the speaker's ironic attitude to the proposition expressed (Blass 1990; Wilson & Sperber 1993). In addition, the allegedly discrete 'metacommunicative uses' of *γiati* (Kalokerinos 2004) picking up elements of the communicative setting, as in (7),

(7) Ο Γιάννης επέστρεψε γιατί δεν το άκουσες.
John came back because you didn't hear it.

have, in actual fact, been argued to fall readily within the category of higher-order assumptions integrating the proposition contained in the main clause (Bardzokas 2012), in alignment with the principle of communicative relevance, along with the relevance-theoretic heuristics (Wilson & Sperber 2012).

3. Experiment

3.1 Subjects

The subjects recruited for the first experiment were the kindergarten and primary school[5] pupils of two schools in two villages in the municipality of Larissa in Greece, i.e. Verdikoussa and Vlachogianni. 84 pupils from Verdikoussa and 105 pupils from Vlachogianni (total 189) took part in the experiment. The group of participants from Verdikoussa was composed of 10 pupils from the kindergarten and 7 first graders, 12 second graders, 13 third graders, 15 fourth graders, 16 fifth graders, and 11 sixth graders from the primary school. Regarding Vlachogianni, the total of 105 students included 15 kindergarten children and 15 first graders, 12 second graders, 22 third

[5] It should be noted at this point that primary education in Greece consists in a six-year period of study in a primary school, following a one-year period of kindergarten education.

graders, 23 fourth graders, 16 fifth graders and 12 sixth graders from the primary school (see Appendix I).

As has been pointed out, each one of the levels of study or grade is taken to represent a coherent age. On average, then, the age of kindergarten pupils are 5, 5 years old on average. Accordingly, first graders are between the age of 6 and 7 during the school year and, moving up to the final level: six graders aged between 11 and 12. Appendix II illustrates the average age of the members of each grade irrespective of their gender at the time of conducting the experiment.

With regard to the second experiment, the subjects were adult students at the 2nd school of second opportunity for adults, in the city of Thessaloniki. More specifically, a school of second opportunity attracts the academic interest of students who never had the opportunity to graduate from junior high-school in their teen years and, by definition, provides them with a second chance at graduation at the corresponding level of study, though this time, as adults (see Appendices III and IV).

3.2 Materials for the experiment

At this point we may recall what the aim of the experiment is to elicit from the participants a causal marker in expressing an epistemic connection. In this way we will be able to check the validity of our assumption that *γiati* constitutes the appropriate linguistic device for epistemic communication. In performing this check, we can also determine whether we may speak of pre-school, primary school and adult native speakers of Modern Greek demonstrating the pragmatic competence required for recognizing epistemic-biased context as a requirement for differentiated encoding.

Along these lines, the type of context that is envisaged as motivating the elicitation of epistemic utterances is the kind of ostensive stimulus that is used to allow the extraction of a tentative conclusion, rather than leading to a description of a (past or present) state of affairs. In this sense, our collection of material that is assumed to serve the above-mentioned purpose of information extraction comprises illustrations used as evidence of an unfortunate incident that is bound to have happened. For instance, one of the pictures portrayed an agitated dog attacking a woman, as seen below (Picture 1). From this evidence it is rather easy to derive conclusions as to what happened to the woman.

[picture taken from www.dailyfun.us]

Picture 1

The resulting event had to be predicted by the subjects. That is, the participants' focus had to be directed to guessing what happened following the situation portrayed based on the visual evidence that the picture bore, rather than making use of the picture to describe the visual input (evidence) as such. The kind of response anticipated on the part of either age band would be *q because p*, *q* framing a speculative hypothesis.

To secure the consistency of the results, each participant was presented with sets of five pictures, rather than one picture only. This decision was made in order to increase the amount of linguistic output and, thus, also the reliability of the output of the experiment, with respect to determining whether the results were constant among the range of answers given by each subject.

3.3 Procedure

The choice of a causal marker is, more often, than not, one made on impulse. In this sense, to secure an impulsive response on the part of the subjects, the choice of material that supports the spontaneous evocation of epistemic contexts does not appear to suffice. A thorny issue in realizing the procedure of the experiment pertains to constraining the elicitation of information requested so that it yields a causal conjunction, in the first place, and an epistemic one, in the second. In this respect, participants were not meant to be explicitly guided to the option of *γiati* over *epiδi*. On the other hand, the type of linguistic response could not be left to pure chance, or we would run the risk of a scant collection of causal material. All these constraints considered an appropriate wording of the question to address subjects could not be one of a direct request for causal utterances, such as *Why are you saying that the*

woman was bitten? This phraseology could be taken to contaminate the results of the experiment, considering the force dynamics of turn taking. The problem here is that the Modern Greek form *γiati* is both a question word (*why?*) and an answer word (*because*) in causal discourse. Thus, a direct sort of request might involve the use of the question word *γiati*, which might, in turn, crucially invite the addressee to the subsequent articulation of its homonym, the subordinating connective. In this respect, a more indirect request that did not contain a *why*-question seemed to be in order, that is, a stimulus of the type that would ideally narrow down the options of linguistic production to causal conjunction, without, however, constraining the selection of the causal connective.

Thus, while participants under discussion were confronted with photographic material, they were also presented with an oral utterance that misrepresented the state of affairs depicted. Upon realisation of the mismatch between the visual information and the false information provided linguistically, the subjects would ideally correct what was said explaining the reason of their revision. In this sense, they were supplied with the following instructions: "You will hear me say something of the picture that I will show you. It will be false, so you must correct it but, also, give me the reason why you're saying this". A repetition was offered to pupils who did not seem to show the expected appreciation of the goal of specific task, following either the initial utterance of the instruction or the first response, in the event that it proved unsuccessful.

With reference to the aforementioned picture illustrating the dog attacking a woman, for instance, the misinformed description was 'The dog is quiet'. The ideal response would involve the specific prompt raising the participants' epistemic vigilance (Sperber et al. 2010) and, thus, stimulating them into taking restorative action, of the sort in "The dog isn't quiet, because it is about to attack the woman". As may have become evident from our description of the desired responses, in order to design this type of context of information elicitation, we paid close attention to the requirement for generating epistemic, thus, procedural, rather than conceptual links. Needless to point out here, of course, that the objective of freer, though not utterly unguided speech production brings in a calculated risk of alternative expressions that could not count towards a total of responses sustaining the generalisations aimed at, i.e. asyndetic versions of a causal relation, the choice of less typical causal marking,

or even a conceptual link revealing a misinterpretation of the level of causal communication requested, for instance, 'The dog is angry because the woman did something to it'.

Now, each subject was called in individually and took a seat facing the computer on which the photographs were presented. They were seated in a quiet room that would minimise the possibility of distraction from the assigned task. Five pictures were randomly selected for each subject out of a total of twenty pictures. In other words, not all subjects were shown the same set of pictures. This type of material allotment served to discourage pupils from leaking information after the experiment, so that the pupils that participated next were more prepared for the task.

3.4 Results

Figure 1 below summarises the percentage of both young and adult participants who came up with a felicitous or successful response to the stimulus provided in the experiment. A felicitous response was the type of response that observed the aim of the experiment, i.e. the elicitation of either *γiati* or *epiδi*, in other words, it was a causal response fitting the expectations of the researcher. In this sense, almost 27 per cent of the children and one third of the adults produced responses irrelevant to the aim of the experiment, e.g. asyndetic conjunctions or clauses introduced by other connectives.

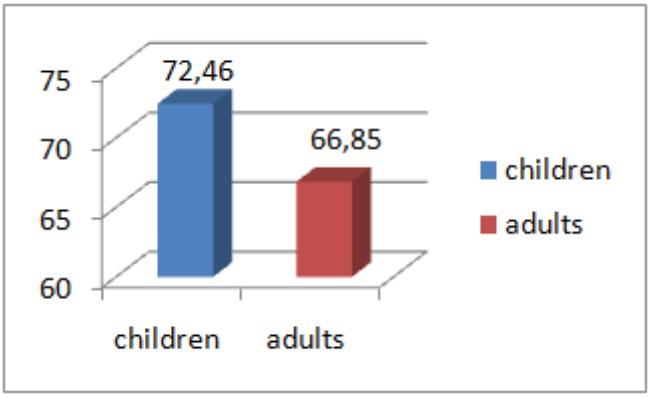

Figure 1: Total number of responses

As is seen in Figure 2 below, of the children that provided a successful response, almost 97 percent of them used *γiati*, rather than *epiδi*, living up to the generalisation

under experimental scrutiny. Likewise, all of the adult students used *γiati* (see Appendices V and VI for raw data).

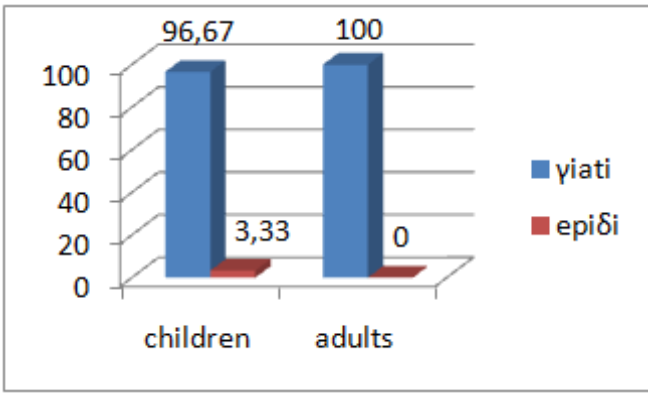

Figure 2: Choice of causal marker

Finally, in Figure 3, the total of responses in each grade of study was converted into an average of 25 responses. According to the results below, the blue bar in the category of children represents the number of *γiati* answers (out of 25), in contrast to the red bar reflecting the number of *epiδi* answers, i.e. 1,8 out of 25, or 3,33 per cent (see Appendix V).

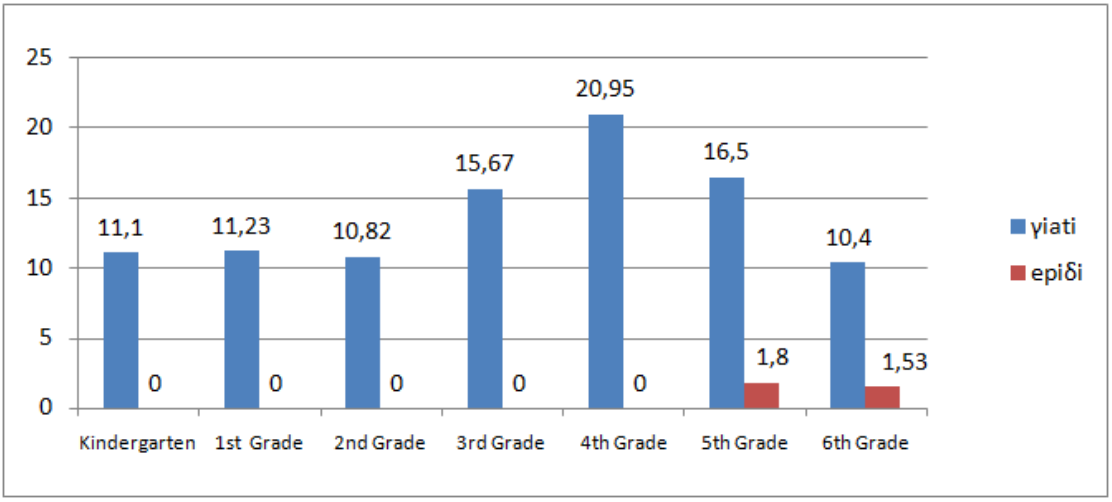

Figure 3: Developmental results

4. Interpretation of results

4.1 Children

The percentage of successful responses in both test-subject groups is taken as strong evidence that the method of elicitation opted for was, on the whole, operative and reliable. Far from discrediting the remaining percentage of what we call unsuccessful answers for the purpose of this research, we think of it as suggesting balanced decision-making in the current experiment. More specifically, the resulting ratio of successful to unsuccessful responses seems to balance out the two criteria considered in setting up our experiment: eliciting targeted causal material against manipulating the causal utterances.

A second point worth raising regards the low rate of *epiδi*-occurrences in the group of children. This score can be claimed to suggest an overall dispreferred application of *epiδi* in contradistinction to that of *γiati* in underspecified contexts of the epistemic type.

The question that seems fair to address, then, seems to concern the minimal use of *epiδi* in the later grades, in conflict with an otherwise overwhelming application of *γiati*. We surmise that the answer lies in the orientation of the education system itself. Namely, granted the syntax-oriented teaching of grammar in primary schools, it comes as no surprise that the teaching of causal connectives conforms to such traditional teaching guidelines. Indeed, the teaching of causal connectives is reserved for these two later levels of study, whereby the two markers, i.e. *γiati* and *epiδi*, are treated as synonymous irrespective of pragmatic considerations. But when this type of flattening approach to teaching interferes with language acquisition, it may be said to disrupt the natural process of language development. In fact, the grammar book used in both grades has been written by well-known syntacticicians, viz. Philippaki-Warburton et al. (2011)[6].

Be that as it may, the type of potential grammar instruction interference described above proves not to have a permanent effect on the use of causal connectives by native speakers of Modern Greek. As we will see, considering the results of the second experiment involving adults (subsection 4.2), the natural use of the two connectives is restored, as it were, as is the process of mother tongue acquisition.

[6] This conclusion has been reached with some reservation granted the implicit claim that it seems to make, namely that grammar instruction may interfere with mother tongue acquisition, rather than L2 learning.

Can it be that children of this age can distinguish between the levels of context underlying the distinct application of each marker, i.e. conceptual vs. procedural context? This is not inconceivable on some level of cognitive analysis, considering their rather constant practice in differentiating the usage of the two connectives. However, a reliable observation of this possibility is hard to pursue given the overlapping nature of *γiati*, serving both as a conceptual and a procedural marker of cause.

4.2 Adults

For starters, 244 or 66,8 per cent of 365, the total of adult participants, came up with a successful causal response, i.e. a causal response fitting the expectations of the researcher. Once again, the specific result is deemed indicative of the operability of our method of eliciting causal utterances. In this connection, the crucial finding here was not the absence of a consistent pattern of responses on the part of the subjects, but the absence of *epiδi*-introduced responses. On this view, the percentage of successful causal utterances achieved appears to suffice for the rather modest purpose of proving the unavailability of the connective at hand in epistemic causal content. More specifically, there were no responses involving the application of *epiδi*. Unlike the case of young children demonstrating a marginal proclivity towards the use of *epiδi*, adults indicated an undeniable preference for the use of *γiati*.

The results of the latter experiment may be taken to suggest that the impact of the pragmatically-insensitive grammar instruction carried out in primary schools has no lasting effect on the choice of causal connectives made by native speakers of Modern Greek. Rather, the use of *γiati* in epistemic subordination is utterly restored, eliminating the prospect of even a marginal distribution of *epiδi*, in natural discourse. Of course, we are fully aware that we cannot ensure optimal reliability for the current experiment as an instrument of observing the discrete use of either connective unless we continue the same project with the same subjects in the foreseeable future with a view to replicating our results.

5. Conclusion

The current work achieved multiple aims. To begin with, it contributed an experimental project to pragmatic investigation, setting a requirement for expanding

the scope of experimental pragmatics. Although experimental observation has traditionally been dedicated to scalar terms of quantity and coordination, we hope to have complemented the role that it fulfils in distinguishing the various facets of communicated content, i.e. semantic or pragmatic, placing subordination among its concerns.

In this connection, the present work focuses on the two prototypical, monolexemic Modern Greek markers of cause *γiati* and *epiδi*, following up on the claim that they serve a distinct discursive purpose (Kitis 2006), inasmuch as they encode disparate constrains on interpretation. In this sense, it has been suggested from a relevance-theoretic perspective, that *epiδi* frames a conceptual marker of causal content, as opposed to *γiati*, which encodes either a conceptual or a procedural relation, playing the part of a polyfunctional marker. The current experiment was conducted, then, to the point of contributing to a consolidation of our suggestion against the common, though less informed view of the two discourse markers as interchangeable across contexts.

To accomplish the aim of the experiment we recruited native speakers of Modern Greek and attempted to elicit causal utterances in the epistemic situations that we simulated pictorially. Granted our earlier claims (Bardzokas 2012, 2014; Kalokerinos 2004; Kitis 2006; Μπακάκου-Ορφανού 2007), the expectation was that the application of *γiati* would outsize that of *epiδi*, to say the least. As it turns out, what started out on more intuitive grounds has now received experimental support. In fact, we carried out a double experiment to this effect. The first experiment involved young, primary school-level children and the second one employed adults. The rationale underlying this two-directional recruitment of subjects was the accumulation of a large and diversified body of native speakers of Modern Greek in terms of age, level of education, gender, even cultural background. The overwhelming majority of participants appeared as conforming to the generalisation that *γiati* is the preferred marker of epistemic cases of non-propositional causal use in Modern Greek discourse. In this sense it can also be argued that both bands of participants demonstrated a high level of appreciation of the differing contexts underlying the divergences in meaning between the aforementioned connectives.

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Appendix I: Profile of primary school participants

	School 1: Verdikoussa		School 2: Vlachogianni		Total
Grade	(Nr of) Boys	(Nr of) Girls	(Nr of) Boys	(Nr of) Girls	
Kindergar.	5	5	8	7	25
1st	4	3	7	8	22
2nd	5	7	6	6	24
3rd	7	6	12	10	35
4th	9	6	11	12	38
5th	8	8	9	7	32
6th	7	4	6	6	23

Appendix II: Average age of primary school participants

	School 1: Verdikoussa	School 2: Vlachogianni
Grade	Average age of participants	Average age of participants
Kindergar.	5,5	5,5
1st	6,5	6,5
2nd	7,5	7,5
3rd	8,5	8,5
4th	9,5	9,5
5th	10,5	10,5
6th	11,5	11,5

Appendix III: The profile of the adult participants

School of second opportunity for adults			
	(Nr of) Men	(Nr of) Women	Total
Adults	35	38	73

Appendix IV: Average age of adult participants

	Average age of participants
Adults	34, 8

Appendix V: Results

The following table summarises the results of the first experiment. With regard to our first experiment, each one of the boys/girls boxes illustrates three sums of responses. The first sum (a) represents the total number of responses extracted from the number of pupils partaking of the experiment. This first result, then, is the product of multiplying the number of participants and the number of photographs illustrated (x students X 5 photographs = y responses). The second subtotal (b) basically amounts to the number of students who delivered a successful response, in the sense of coming up with an utterance that satisfies the intention of the experiment, i.e. one that encodes either one of the prototypical causal subordinators (x/y, or x successful responses out of the y number of participants. Finally, there is a third result (c) that is meant to capture the number of not only successful responses, but, in fact, appropriate responses of the sort that encode *γiati*, rather than *epiδi*.

	School 1: Verdikoussa		School 2: Vlachogianni		Subjects: total nr	Average age
Grade	**Boys**	**Girls**	**Boys**	**Girls**		
Kinderg arten	a.5sX5p=25r b.15/25 c.15γ/-e	a.5sX5p=25r b.17/25 c.17γ/-e	a.8sX5p=40r b.27/40 c. 27γ/-e	a.7sX5p=35r b.21/35 c.21γ/-e	25	5,7
1st	a.4sX5p=20r b.15/20 c.15γ/-e	a.3sX5p=15r b.10/15 c.10γ/-e	a.7sX5p=35r b.26/35 c.26γ/-e	a.8sX5p=40r b.30/40 c.30γ/-e	22	6,6
2nd	a.5sX5p=25r b.10/25 c.10γ/-e	a.7sX5p=35r b.26/35 c.26γ/-e	a.6sX5p=30r b.19/30 c.19γ/-e	a.6sX5p=30r b.23/30 c.23γ/-e	24	7,8
3rd	a.7sX5p=35r b.20/35 c.20γ/-e	a.6sX5p=30r b.18/30 c.18γ/-e	a.12sX5p=60r b.45/60 c.45γ/-e	a.10sX5p=50r b.30/40 c.30γ/-e	35	8,8
4th	a.9sX5p=45r b.32/45 c.32γ/-e	a.6sX5p=30r b.19/30 c.19γ/-e	a.11sX5p=55r b.52/55 c.52γ/-e	a.12sX5p=60r b.48/50 c.48γ/-e	38	9,6
5th	a.8sX5p=40r b.34/40 c.30γ/4e	a.8sX5p=40r b.31/40 c.27γ/4e	a.9sX5p=45r b.37/45 c.32γ/5e	a.7sX5p=35r b.30/35 c.30γ/-e	32	10,7
6th	a.7sX5p=35r b.28/35 c.26γ/2e	a.4sX5p=20r b.16/20 c.15γ/1e	a.6sX5p=30r b.22/30 c.20γ/2e	a.6sX5p=30r b.20/30 c.14γ/6e	23	11,7

Appendix VI

	2nd School of second opportunity		Subjects: total nr	Average age
Grade	**Male students**	**Female students**		
1st & 2nd	a.35sX5p=175r b.175/113 c.113γ/-e	a.38sX5p=190r b.190/131 c.131γ/-e	73	34,8